

On Conservation and Development: The Role of Traditional Mud Brick Firms in Southern Yemen*

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ABSTRACT

A study of small and medium enterprises that make up the highly specialized mud brick construction industry in southern Yemen reveals how the practice has been sustained through closely-linked regional production chains and strong firm inter-relationships. Yemen, as it struggles to grow as a nation, has the potential to gain from examining the contribution that these institutions make to an ancient building practice that still continues to provide jobs and train new skilled workers. The impact of these firms can be bolstered through formal recognition and capacity development. UNESCO, ICOMOS, and other conservation agencies active in the region provide a model that emphasizes architectural conservation as well as the concurrent development of the existing socioeconomic linkages. The primary challenge is that mud brick construction is considered obsolete, but evidence shows that the underlying institutions are resilient and sustainable, and can potentially provide positive regional policy implications.

Key Words: *conservation, planning, development, informal sector, capacity building, Yemen, mud brick construction.*

* Paper prepared for GLOBELICS 2009: Inclusive Growth, Innovation and Technological Change: education, social capital and sustainable development, October 6th – 8th, 2009, Dakar, Senegal.

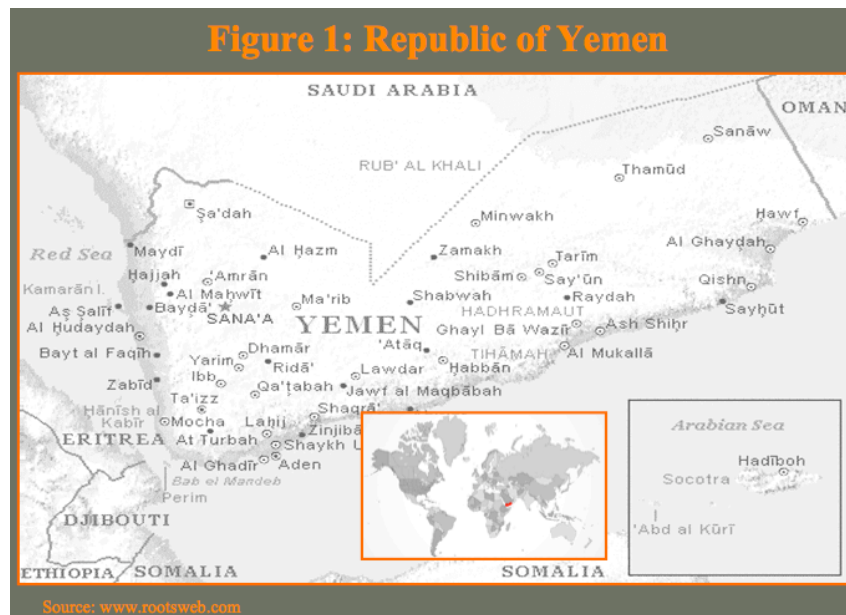
** Mehta, Deepa. (2007). "On Conservation and Development: The Role of Traditional Mud Brick Firms in Southern Yemen." Unpublished Master's Degree Thesis, Columbia University's Graduate School of Architecture, Planning and Preservation.

“Man's economy, as a rule, is submerged in his social relationships.”
- Karl Polanyi (1944)

INTRODUCTION

Mud brick construction in the Hadhramaut Valley has been an active regional industry for hundreds of years and has recently become affected by a series of public and private conservation and development imperatives at the local, regional, national, and international levels (Figure 1).¹ The central assumption in this study is that the mud brick construction industry has a series of extrinsic and intrinsic institutional characteristics that allow this tradition to remain a viable practice today.

This study serves to understand how small firms, however traditional, affected by macroeconomic social, political, and economic variables, can play a role in transitioning economies. This research can help to serve nations like Yemen position their rich cultural currency beyond tourism and adopt an approach to capture value from small-sized cultural crafts and construction firms towards more mainstream goals of development. Mud brick construction and other vibrant forms of traditional industries prevalent across Yemen are more than phenomena that are embedded in the cultural ethos of the nation: the mud brick sector may offer insight about innovative strategies shaping development paradigms today.



Mud brick technology continues to be a primary mode of development in the Hadhramaut. The region boasts mud brick homes, schools, and even a regional airport. Modern modes of construction like concrete trickled into the Hadhramaut throughout the 20th century, but until unification, changes in the use of construction materials had been minor. Today, it is possible to see growth in mechanized building materials across the cities of the Wadi Hadhramaut. As Yemen's macroeconomic policies push towards industrialization and modernization to increase its standing by international development standards, will this affect demand for “modern” buildings? Will modernization preclude mud brick structures? Will

¹ The “Hadhramaut Valley” is also interchangeably called “Wadi Hadhramaut” or “Hadhramaut” throughout this paper. Additionally, the adjective “Hadhrami” is also derived from the central term, meaning “Of or belonging to Hadhramaut”.

conservation mean the mere preservation of existing structures as it does in most other contexts?

Interestingly, while least developing countries like Yemen are attempting to promote growth through industrialization and economies of scale, contemporary urbanism and architecture in more post-industrialized countries are undergoing a socioeconomic institutional restructuring away from the paradigm of an industrialized mass society, towards a postindustrial economy of flexible specialization, where strategy plays a larger role than scale and where economy and technology are malleable assets. (Sabel & Zeitlin, 1997)

As a whole, by offering empirical observations supported by theoretical assumptions, the research hopes to augment current conservation-development literature about the role of small firms within the wider historically and geographically bound institutions that they are embedded in. Evidence for this study was gathered through 23 informal and formal open-ended interviews during a four-week period with planning officials, architectural conservators, technical assistance specialists, local leaders, and other governing officials.

MUD BRICK TECHNOLOGY: THE PROCESS

Earthen architecture is an important element in the study of urban planning precisely because it has been employed globally for millennia as a building material. The result has been amazingly long-lasting buildings made out of local materials, that have continuously shaped urban systems. Some of the earliest examples of earthen architecture can be found in Jericho where 10,000 year-old mud brick construction has been excavated, and in Çatal Hüyük, Turkey's 7,000 year-old Neolithic mud brick city that is one of the earliest sites of "complex architecture featuring multiple functions and town planning" (Jerome, 2000). Today, 50 percent of the world population lives in earthen dwellings ("Earthen Architecture Blog").

Natural building materials, technologies, and practices have evolved through the ages. In the case of mud as a construction material, mud was first introduced prior to 8000 BC, sun-dried bricks were introduced in 6000 BC and lime in 3000 BC. (Reddy, 2004) From basic rammed earth construction to sun-dried mud bricks to industrialized compressed mud bricks, earthen construction forms can be found around the world. Yemen is one of many countries that boast a variety of natural building materials across its various regions. Although puddled earth is the method of mud construction in northern Yemen, sun-dried mud bricks are widely used in the Hadhramaut region and thus serve as the central technology that is being investigated here.

The essential constituents of mud bricks are soil, chopped straw and water: these elements are manually mixed into a consistent mixture, which is formed into bricks of a standard size using an open mould. (Oates, 1990) The bricks are formed in large mud brick yards on the outskirts of town and are laid out to dry in the sun for at least one week, and then the bricks are ready for building. Mud mortar, essentially made of the same composition, is used as a setting bed. The bricks themselves are of surprising strength when new, although their resistance to fracture decreases with the decay of the straw, which acts as both fibrous reinforcement and shrinkage compensation. They have better insulating qualities than baked bricks or concrete blocks, are easy to construct with, and are extremely durable, provided that regular replastering of their exterior is conducted when necessary. The bricks are manually laid, usually one floor at a time (Figure 9). At times, lime is used to coat exterior and interior surfaces to increase the building's longevity, and almost always, a stone foundation is built to act as a damp course. (Jerome et. al., 1999: 5)

Figure 9: Mud brick craftsman constructing a wall



Source: Deepa Mehta

In this way, homes and buildings are constructed in geographically appropriate locations that minimize the opportunity for flooding and other environmental damage. Well-planned use of mud bricks can lead to optimal low-cost housing for arid areas. While shrinkage, erosion, and mechanical damage can affect mud construction, like any other building material, preventative measures can be taken to innovate the material itself rather than constructing with high cost, imported materials such as cement and concrete. For an area like southern Yemen, preventative measures highlighting good planning, improved workmanship, and financial assistance can be recommended (Figure 10).

YEMEN: A CONTEXT

Located on the southern tip of the Arabian Peninsula, with Oman to the east and Saudi Arabia to the north, today the Republic of Yemen has a population of 22.2 million. Its capital city, Sana'a, is home to over a tenth of the national population. Nationally, Yemen has traditionally been an agricultural economy with much growth in oil revenues and infrastructure and business revenues over the past decade. Less than three percent of the land in Yemen is arable. (Yemen, 2007) Yemen is also the site of ancient human civilizations dating back to the seventh and ninth centuries BC (Hansen, et. al., 2004). The nation, and especially the Hadhramaut region, has had a vibrant past: this is the land of the Queen of Sheba, pre-Islamic temples constructed of earthen architecture, and pre-modern international trade routes that spanned from India to Syria.

Social order in Yemen has always been highly stratified with distinct class demarcations and living quarters. Especially in the Hadhramaut, this firm social system has also been accompanied by a strong sentiment towards international travel in order to acquire wealth, as promulgated by ancient caravan trade routes through the region and the medieval intercontinental Indian Ocean trade. One of the resulting social stratifications has been a lineage of craftsmen and artisans, who helped retain earthen architecture techniques over millennia. Especially in the Hadhramaut region in southeastern Yemen, mud brick masters and masons continue to produce the mud brick architectural tradition today.

Modernization of machines and transportation in the 19th and 20th centuries, starting in Western Europe

and the United States, witnessed an exemplar international shift towards industrialized goods. The form of many cities and nations that were a part of this new industrial economy began to increasingly incorporate new mechanized building materials.

In this period, much of Yemen remained isolated from international industrial development. Through much of the 20th century, Yemen had been afflicted by foreign occupation, internal strife, environmental setbacks, and economic instability. In international interest, the British Empire annexed the city of Aden for its strategic port and thus had a de-facto rule over southern Yemen for the next 130 years, while the Ottoman Empire annexed northern Yemen at the turn of the 20th century. Ongoing tribal warfare and military *coups*, severe droughts (1970s and 1980s), freedom and unification (1970s to 1990), the Gulf War (1992), and the country's own civil war (1994) marked the major events for much of the last century, resulting in high levels of inflation, economic instability, and caution from the international community.

Today, by international standards, Yemen is extremely poor and is growing fast. It is classified as one of the world's 20 least developed countries and with a low Human Development Index. (UNDP, 2006) Based on 2003 figures, over 45 percent of the population lives below the international poverty line (percent of population making less than \$1 per day), while Yemen's 2006 estimated gross domestic product (GDP), the national number growing at just over three percent per year, at purchasing power parity (PPP) per capita is \$900. At the same time, the population in Yemen is among one of the fastest growing, at a rate of nearly 3.5 percent, more than tripling growth rates in the United States. (Yemen, 2007)

In an effort to improve its international standing, Yemen's latest five-year plan and long-range plans both look towards increasing economic growth and reducing poverty. These policies have begun to impact growth in various sectors such as oil production, infrastructure development, and manufacturing industries. New roads, telecommunications systems, and production materials are bringing visible changes. As Yemen meanders as a *pretake-off society*, where the "transition to a modern society has begun; whether—or perhaps better, when—it will be complete is far from certain" this middle ground creates the central questions surrounding the future of the nation's built environment (Geertz, 1963: 4).

Just as soon as international norms began to shape development and growth in Yemen, the conservation movement soon followed suit to impact the future of Yemen's traditional heritage. In the 1980s, three of Yemen's premier cities, Sana'a, Zabid, and Shibam, gained *World Heritage* status under the auspices of the World Heritage Center at United Nations Educational, Scientific, and Cultural Organization (UNESCO). From 2000 to 2004, the World Monuments Fund (WMF) listed the historic fabric of the city of Tarim as endangered and before that Shibam was on the WMF's 100 Most Endangered Sites List. In addition, a range of regional and national conservation agencies that recognize the national cultural currency can be found throughout Yemen.

The range of pre-industrialized lifestyles and built forms juxtaposed with modernizing socioeconomic institutions make Yemen an ideal setting within which to study the social complexities of conservation and development. This combination is especially significant in the Hadhramaut. The Hadhramaut Governorate is spatially the largest of the 20 governorates in Yemen, has over a million residents, and it is also one of the fastest growing (increasing by over three percent every year) ("Special Appendix": 3). Additionally, the region is extremely fertile and the primary source of Yemen's oil supply, and business and trade industries are only growing here. The landscape of the Wadi is distinctly marked by its fertile oases and densely built cities of multi-storey mud brick architecture. The region has also caught the eye of international conservators: the Old Walled City of Shibam (Figure 2) and Tarim Historic City are both located here.

Figure 2: Old Walled City of Shibam



Source: Deepa Mehta

ON DEVELOPMENT

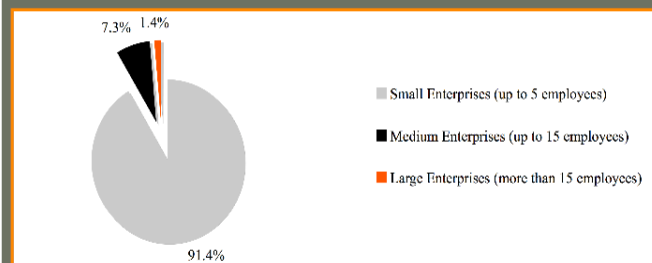
One of the manifestations of the broader concept of globalization includes greater levels of social, political, and economic interconnectivity between nations. Modern political economy places an indexing mechanism as a coordinating system for determining the relative development of nations. While the top third of the list consists of “developed countries” and the middle third consists of “newly industrializing countries” or “emerging markets”, the bottom third of the record is categorized as the “least developing countries” (LDC). Parameters for the LDC are established by three central criteria by the UN-OHRLLS: low income (under \$750 per capita income), poor human resources (low levels of nutrition, education, health, and literacy), and high levels of political, economic, and geographic vulnerability. (UN-OHRLLS, 2007) Such characterization automatically defines development challenges for the bottom third of the global economy.

It is important to understand how these basic parameters manifest into policy by also considering the causal and effectual institutions that affect how goals are met. (Harris-White, 2003; Ingham, 1993; Polanyi, 1944; Polanyi, et. al., 1957) Trade and foreign direct investment and international norms greatly impact what national, regional, and local policies an LDC is able to promote. However, “the market as the sole frame of reference is somewhat out of date” (Polanyi, Karl et al., 1957). In addition to the market system, phenomena like mud brick development in the Hadhramaut are strongly influenced by non-economic institutions and are *embedded* in society and its social and cultural foundations. Pure functions of the price mechanism do not offer enough evidence to study the extent of certain industries. Braudel also offers the claim that economies have political and social implications that greatly impact their trajectories of growth: societies and their *ancien* regimes evolve slowly and thus a broader view at understanding how nations grow must be taken into consideration (Braudel, 1992).

This necessitates the importance that developing countries with active traditional modes of exchange must place on social institutions of networks, politics, and local values to determine appropriate goals for development. As the LDC, led by hegemonic indicators and norms of development, moves towards modernization and chooses *how* to increase productivity and reduce poverty, its socially embedded institutions can play a determining role. As a whole, here states exert power to formalize of social networks and traditional organization ultimately to secure domestic growth.

As developing states begin to arrive at a national convergence towards the international modernization regime by mass manufacturing, post-industrial states have begun a systematic deregulation and reduction of mass manufacturing, sparking a unique *centralized decentralization* process in places like Yemen in an effort to catch up. ("Yemen's Strategic Vision 2025", 2005) International institutional fragility and mutability "continuously transformed by the introduction of new technologies and organizational forms" have led to a renewed specialization of industries (Sabel & Zeitlin, 1997: 1). Interestingly though, small and specialized industry is not a new idea for Yemen. Here, 90 percent of the nation's manufacturing enterprises are small in scale employing up to five persons, (Figures 6 and 7) (Yemen, 2006: 54). As a result, one of Yemen's top goals is to support growths in market share offered by small and medium enterprises (SME's) by providing them with technical and financial assistance.

Figure 6: Yemen's Industrial Enterprises by Size (2003)



Data Source: Third Socioeconomic Development Plan for Poverty Reduction 2006-2010 (Republic of Yemen)

Figure 7: SME Value Added 2005-2010

Industrial Activity	Value Added (in million YR)		Average Annual Growth (%)
	2005	2010	
Food and Beverages	43,890	73,077	10.7
Tobacco Products	28,732	61,926	16.6
Textiles	5,310	15,134	23.3
Clothes and Fur	7,571	21,237	22.9
Bags, Shoes and Tanning	553	384	-7.0
Wooden products (without Furniture)	4,305	8,373	14.2
Paper and its By-products	683	420	-9.3
Printing and Publishing	5,664	8,000	7.2
Oil Derivatives	10,290	13,740	6.0
Chemical Products and derivatives	1,365	1,536	2.4
Plastic Products	5,038	14,233	23.1
Non-Metallic Products (Construction)	21,036	42,072	14.9
Moulded Metal Products	14,450	33,886	18.6
Tools and Machines	185	527	23.3
Machines and Electrical Apparatuses	31	37	3.6
Other Transportation Tools	27	-	-
Furniture	5,254	17,259	26.9
Total	154,384	311,841	15.1

Source: Third Socioeconomic Development Plan for Poverty Reduction 2006-2010 (Republic of Yemen)

Many SME's dealing with the crafts in Yemen are highly specialized industries that have lasted for millennia. From rock-cut architecture in South Asia to ancient agricultural practices in Africa, traditional industries and organizational strategies continue to inform the world today. These crafts have seldom lasted in isolation; they have been adjoined with strategic decisions of power relations, socialization, and exchange, which have determined their growth in various ways over time. (Harris-White, 2003; Sabel &

Zeitlin, 1997) Throughout history, spatially-bound specialized industries have consciously or unconsciously selected their development trajectories in the face of evolving modernities and institutional conditions through flexible production, high degrees of specialization, and niche skills that can be seen in the traditional building crafts in Yemen.

In the case of textiles, specifically in its heyday Lyon's 19th century silk production, silk merchants here faced heavy competition among other high-end silk producers in Italy and the Netherlands and mass producers in England. However, by developing unique, quality fabrics, despite high prices, the French merchants were consciously strategic and were able to capture competitive advantage and gain popularity over all rivaling silk manufacturing industries at the time. The Lyonese merchants, utilizing a "time-based" monopolistic competition strategy, offered their customers the added value of an ongoing range of fashionably new fabrics and individualized service. These merchant manufacturers developed small workshops where skills were boosted and honed through continuous innovation. Interestingly, Lyonese silk manufacturers collectively shared major inventions and this process was augmented by silk research organizations and government support. In Lyon there existed equilibrium between "decentralized coordination and a common normative orientation." (Cottureau, 1997; Poni, 1997)

Literature on production specialization can illuminate how flexibility has played a key role for success, however, this does not paint a complete picture of the nature of pre-industrialized earthen architecture that is still very much an active form of development in southern Yemen. To this extent, pre-industrial modes of building production in Milan in the 1800s offer insights as to how the highly stratified social relations and trade networks that shaped the Hadhramaut's history. Elements are visible today in its perpetuated mud brick building craft, and could have put in place advanced organizational mechanisms that have so far merged with today's modern economy. (Mocarelli, 2004)

It is only now, in recent years, that the built environment, among other aspects of Hadhrami society, is threatened by the impacts of the new modes of economics, socialization, and historical significance that have been redefining Yemen as a nation. With increased infrastructure, manufacturing, and liberalized investment patterns across this growing country, traditional industries like mud brick architecture cannot remain insulated and *en vogue* indefinitely as new supplies of architectural methods and consumer demands are springing up across this modernizing region. It remains to be seen whether catching up for Yemen can go as far as employing the new postindustrial models of flexibility and specialization versus mass production and homogeneity. At the present though, as Yemen is still in the process of decentralization and industrialization, there are real dangers for the future of mud brick architecture. The current rise in international conservation practice provides an avenue for mud brick firms to remain in production until policies for SME's in the traditional building trade in Yemen can be formalized.

ON CONSERVATION

The *Athens Charter* (1931) and the *Venice Charter* (1964) established the importance of preserving historically significant monuments and thus provided the basis for International Council on Monuments and Sites (ICOMOS) to begin recognizing the need for protecting built heritage and the establishment of the conservation approach for historic monuments. In 1972, many developing countries signed UNESCO's *Convention Concerning the Protection of the World's Cultural and Natural Heritage*. By 1977, the listing of World Heritage Sites began. The UNESCO *Convention* introduced for the first time the concept of *outstanding universal value* (OUV) of cultural heritage, which is the basis for listing and rehabilitation concepts. UNESCO also promoted the establishment of a fund for the protection of the world cultural and natural heritage.

One of the greatest transitions in this international effort arose from a conference held in Nara, Japan in 1994. The idea of OUV has been further promulgated by the inception of the *Nara Document on*

Authenticity (1994) that furthered the concept of authenticity to include unique cultural practices and provides more flexible criteria to judge the validity of preserving cultural contents. *Nara* helped to expand the definition for authenticity to include both tangible and intangible heritage processes. In this way, the concept of protecting built heritage altered from a preservation-based strategy to a more holistic conservation-based strategy that takes into account contextual arrangements that influence a site's ontological element.

As of today, there are 830 World Heritage Sites inscribed on the list, and the Organization of World Heritage Cities, a non-profit non-governmental organization dedicated to the issues of urban world heritage, lists 226 of these sites as official "World Heritage Cities". In 2002, leaders of the World Heritage Centre and a number of different non-governmental organizations, technical assistance agencies, and researchers convened to strengthen partnerships to safeguard the development of World Heritage Cities. Here, Francesco Bandarin, Director of the World Heritage Centre, also included urban heritage to incorporate those cities which embraced heritage monuments. Thus, around 330 of the protected heritage sites represent urban heritage combining World Heritage Cities as well as World Heritage Sites located within urban places, providing a stronger case for understanding the implications and inherent opportunities of world heritage institutionalization. Thus, heritage management is more and more becoming a question of urban management of historic urban landscapes.

Urban heritage management has been practiced in a multitude of ways, especially over the past three decades. The need for urban revitalization and adaptive reuse began to prevail in all heritage-rich cities like Budapest to cities in developing countries like Mostar, Bosnia and Herzegovina and Fez, Morocco. (Steinberg, 1996) Tourism and the economics of heritage consumption have also come to play a major role as in Angkor in Cambodia. Cases such as Tunis brought to the foreground the importance of community involvement in heritage management. (Akrout-Yaiche, 2002)

An increasing range of literature is more and more focusing on the "urban" in heritage management. From issues such as rapidly increasing land values in Angkor to extreme poverty in places like Tripoli and Cairo, entities such as the World Bank have also begun to place careful attention on the idea of urban heritage and development. From infrastructure planning to vocational training to the provision of technical assistance, international aid and development agencies have begun to incorporate heritage-based planning and management strategies around the world.

This symbiotic planning approach that combines conservation and development elements to influence spatial systems has manifest itself in many forms: from "World Heritage Cities" that encompass the notion of "urban heritage", to "cultural revitalization" which embodies culture-based renewal strategies across many urban areas, especially post-industrial redevelopment, to "cultural landscapes" which recognize the inherent regional values, to notions of "intangible heritage", which is concerned with conserving processes, practices, and traditions that are not necessarily of the built form.

Although much of culture-based development can be classified as heritage and tourism-driven, integrating cultural heritage concerns in sustainable development models, and particularly in sustainable construction, is also an emerging area of growth. (Avrami, 2004) Today, with more of an emphasis on *local knowledge* and *vernacular traditions*, conservation specialists argue that traditional architecture has the ability for an unprecedented opportunity to expand its scope by considering the way in which the expertise of vernacular builders can be useful in the future, especially with the impending need to build affordable and safe housing options for an ever-increasing world population. (Oliver, 2003) By a collaborated promotion of advances in traditional technology, sustaining its production can transform development practice.

Heritage Tourism is Not Enough

The way in which sites and places are conserved and developed is facing a deluge of changes today,

especially for developing countries. As societies transition from traditional methods to more mass manufactured forms in construction, the conservation of some of these traditional solutions reinforced by technical and organizational improvements can help bring production and growth as well as preservation of viable traditions. Unfortunately, there is a general lack of empirical literature that describes how traditional firms today make decisions based on the institutional constraints of their markets, especially as they are at the crossroads of “tradition” and “modernity”. This convergence can be seen as one solution for protecting the future of small, regional, highly specialized industries around the world as well as helping developing regions increase growth.

CONSERVATION AND DEVELOPMENT IN YEMEN’S MUD-BRICK INDUSTRY

The mud brick industry in Yemen posits institutional constraints and opportunities through a range of historical and spatial scales. Engaging with conservation and development issues in Yemen is unique because here, conservation came onto the scene even before modernization has fully begun and traditional craftsmen are still practicing their age-old trade.

Yemen’s federal government identified microfinance as a central policy tool to expand SME’s. In 2002, the United Nations Capital Development Fund (UNCDF) conducted a study with Yemen’s Ministry of Small and Medium Enterprises found that 310,000 SME’s employed 485,000 people (12 percent of the total number of economically active people in Yemen). The government subsequently launched the *Decentralization and Local Development Support Programme* in two governorates (Hadhramaut and Taiz) in 2003. The project provides investments in regional capital improvement projects like infrastructure along with technical and capital assistance to SME’s in order to promote local economic development.

This is coupled with the ongoing need, stated in the country’s second five-year plan from 2001 to 2005 for “preserving the traditional life of the dwellers of cities and villages while improving their living standards and their access to infrastructure services,” calling for an awareness of traditional architecture values among local societies. Above all, according to the 2nd five-year plan, the “main challenge for Yemen” is:

to attain a dynamic and broad-based growth in the private sector, given its two critical and inter-related factors: (i) the weak institutional environment for the private sector in terms of weak governance and few market-promoting institutions, and (ii) the small size of the manufacturing sector, and the persistently small size of most Yemeni firms. (Yemen, 2000)

According to the Small and Micro-Enterprise Development Unit of Yemen’s Social Fund for Development (SFD), in 2005 alone, \$3.5 million in internationally and nationally-funded microloans were disbursed to small-scale enterprises throughout the nation. Between 2002 and 2005, \$510,000 was disbursed through Seyoun in the Wadi Hadhramaut. (Social Fund for Development, 2005) However, the specific focus on supporting small-scale traditional craft industries from the heritage conservation angle is weak. Yemen is a developing country where education, poverty alleviation, and job creation are central objectives.

From the government side, policy has been augmented by the 2002 *Poverty Reduction Strategy* that earmarked support for SME’s (\$1,426,000) as well as a tourism-based Preservation of Historic Cities program (\$11,958,000) (Yemen, Republic Of, 2002). In addition, the latest five-year plan for 2006-2010 has placed SME’s at the center of its national poverty reduction strategy, informed by a long-range plan dedicated to reach higher levels of institutional capacity and GDP by the year 2025. (Yemen, 2006) Direct subsidies from the government for broad improvements in infrastructure, telecommunications, and institutional capacity building coupled with external aid for designated projects can greatly provide wider

foundational support and local opportunities for SME's across Yemen; these opportunities can be harnessed for conservation ends by craft-oriented micro-enterprises.

While it was mentioned earlier in the paper that most of the businesses in Yemen are SME's, most of these businesses happen to be agriculture-based; overall, the entire industry serves as an indirect or direct source of income for 73.5 percent of the population in Yemen and contributes to 20.5 percent of the GDP (Social Fund for Development, 2005: 45). For the traditional industries, at the face of it, they are collapsed within national building and construction as well as real estate and business services sectors (Figure 16). This does not provide a clear picture about where traditional industries stand and just how payments, agreements, and services are quantified across informal and formal systems. In fact, macroeconomic policy has not conducted a level of analysis that takes into account specifically the traditional construction SME. For this, it is important to look at issues on the ground and history of this sector.

Figure 16: National Growth Sectors

Description	% from GDP			Average growth %	
	Achieved in 2000	Preliminary estimate 2005	Targeted 2005	Preliminary estimate	Targeted
Agriculture, forestry and (animal) venery	20.4	19.2	14.5	2.9	6.1
Hunting	0.5	1.1	1.6	22.2	13.1
Manufacturing industries (without oil refining)	9.2	9.5	6	4.8	10
Oil-Refining industry	0.4	0.3	2.8	2.6	7.5
Mining (Extraction) industries (without oil)	0.5	0.6	0.1	6.1	10
Water, electricity, and gas	1.2	1.4	0.8	7.6	9.2
Building and construction	2	2.2	5.5	5.8	11
Total of goods sectors	34.3	34.4	31.3	4.2	8.1
Wholesale and retail trade	6.2	7.5	8.4	8.3	9
Restaurants and hotels	0.9	0.8	0.9	0.9	10.7
Repair and maintenance	0.9	0.9	0.9	4.3	8.3
Transport, storage, and communications	11.4	13.6	12.2	7.9	9.1
Financing and insurance	4.9	3.5	3.8	-3	12
Real estate and business services	5	5.6	5.5	6.3	8
Personal and social services	1.1	2.1	0.9	18.7	6.5
Total of service sectors	30.5	33.9	32.5	6.4	9.1
Grand total of production sectors	64.8	68.3	63.9	5.3	8.6
Government services producers	20.5	20.4	10.4	4.1	4.7
Family sector	0.1	0.1	-	1	-
Not-for-profit bodies/organisations	0.2	0.3	0.1	9.3	5
Customs duties	1.8	1.2	1.9	-3.7	3.7
Less - imputed bank services charges	-4.4	-2.8	1.9	-4.8	3.1
Non-oil (sectors) GDP	83	87.6	74.3	5.3	8
Crude oil extraction GDP	17	12.4	25.7	-2.2	0
GDP at market price	100	100	100	4.1	5.6

Source: Source: Third Socioeconomic Development Plan for Poverty Reduction 2006-2010 (Republic of Yemen)

Given Yemen's vast stock of rich built heritage in need of conservation, the nation's policymakers admit that it is extremely difficult to select which projects to subsidize and which projects to hold off on. In the case of Sana'a, though the Old Walled City of Sana'a is designated as a World Heritage Site, the entire city is still a developing metropolis with rapid urban growth, poverty, infrastructure and sewage issues, and general planning challenges. (Al-Arhabi, 2006; Dallami, 2006; Hadrami, 2006; Liviadotti, 2006)

One of the biggest conservation challenges that has been echoed by independent national conservators as well as national and local officials is the need for effective management of conserved place (Hadrami, 2006). The deterioration and mismanagement of heritage sites like Sana'a and another World Heritage City, Zabid, has been devastating. For example, the \$20 million that has been spent on the conservation of Zabid over the past 20 years is gone today, as more than 80 percent of the city is destroyed through

abandonment and unplanned construction of concrete structures and now, an effort led by UNESCO and agencies such as Yemen's SFD and the *Deutsche Gesellschaft für Technische Zusammenarbeit* (German Technical Cooperation or GTZ) are at work trying to recoup losses there. (Hadrami, 2006)

At the same time, economic decline in 1990s also brought about a period a revival in traditional building trades due to the lack of foreign competition and abundance of locally derived building materials as well as heightened national awareness of the country's unique architectural heritage as a result of the presence of intergovernmental conservation institutions like UNESCO. (Marchand, 2003) One ethnographic study with Sanaani craftsmen revealed "complex regimes of socialization and training to generate competent agents with distinct roles and recognized status in a given society" (Marchand, 2003).

Wadi Hadhramaut is the chief geographic region that makes up the largest out of 20 governorates in Yemen. Hadhramaut Governorate has an estimated area of 167,749 km, constituting 36 percent of the total land area in Yemen. According to the preliminary results of the 2004 Census, derived from the Office of the Deputy Minister of Planning in Seyoun and conducted by the central government, the governorate has a population of 1,029,462 residents with a population growth of 3.09 percent per year. (Yemen, 2005)

The Hadhramaut has an abundance of agricultural land for Yemen (where only 2.9 percent of land is arable). The fertile land has been an excellent source of grains, dates, and natural fibers for textile production. This desert oasis also has some of the most mineral-rich soil, which makes for an excellent mud construction material. Mud is collected from cultivated fields near palm trees where it is absolutely saturated with water, making the mud very strong. (Borelli & Jerome, 1999) Local mud brick craftsmen who build elaborate homes and monuments along the Wadi have used this mud for thousands of years. Thus, the mud brick industry of the Hadhramaut is widely respected.

23.1 percent of the population is a part of the labor force here in the Hadhramaut. Agriculture, fisheries, oil and mineral mining, as well as telecommunications and infrastructure development are the central sources of industry in the region. Heritage and tourism is also an emerging sector. Together, 1,734 projects were implemented between 1990 and 2004, mostly financed by the government in addition to external, private, and self-finance. The most strategic projects were the construction of central roads, ports, marine protection, and proliferation of agricultural seeds and inputs. (Yemen, 2005: 6)

MUD BRICK CONSTRUCTION IN THE HADHRAMAUT

The mud brick industry is an apprenticed craft that continues to play a critical role in the Hadhrami economy. In 2005 alone, over 90 percent of construction in the Hadhramaut was mud-based. There is also a high availability of experienced laborers and craftsmen (builders and master masons) and the cost of a mud home is less expensive than concrete construction costs which generally runs up to 30 percent higher due to steel reinforcing.

The enterprises are usually quite small, consisting of the following members (Figure 17).

Figure 17: The Traditional Mud Brick Firm

<i>Ma'allim (or Usta)</i>	Master Craftsman
<i>Sikin</i>	2 nd Craftsman
<i>Basir</i>	Apprentice
<i>Banana</i>	2 nd Apprentice
<i>Amil bina</i>	General Builder

Source: (Damluji, 1992)

A good master craftsman makes up to \$250 per month, annually more than four times the national income per capita, while an average craftsman will make about \$190 per month. (Fagi, 2007) Highly sought after master craftsmen and their teams often travel through the Wadi and beyond when commissioned for building projects. Traditionally, the owner who commissions the construction determines the design of the house. Upon getting an estimate and a floor plan from the master craftsman, the master craftsman or the owner apply for an official building permit with the local Ministry of Public Works and thus, the building project is under way. Many years ago, it would take five or eight years to complete a house; today, an average size home can take anywhere from one to eight months through to completion. (Borelli & Jerome, 1999)

The building process, as described earlier, displays a certain degree of “serendipity” (Varanda, 1994: 121). The tools required for building are simple, comprising of wood forms and paddles. (Varanda, 1994) This serendipitous process is documented in a straightforward manner in *The Architecture of Mud*. At one conjecture in the film, mud brick masons are asked about the dimensions of a mold. After some rumination a mason brings forth a measuring tape, and replies, “12.5 inches wide, 19 inches long...bigger for a two-brick mold.” (Borelli & Jerome, 1999) Ali Yislam Maudi, one of the masons interviewed in the film by Caterina Borelli and Pamela Jerome (1999), when asked how wide the wall above the stone foundation is in a mud brick home, he replied that it is a “*dhra*”² plus four fingers [and if the building is] tall and large, two *dhra*’.” In this way, there is an informal, capricious element in the process.

Today the craft has remained unchanged and requires intensive labor input and highly specialized skills that are acquired over time. Homes easily incorporate adaptive technology such as plumbing, electricity, and modern amenities of the like. While they embody a large degree of socialization and specialization, the labor organization of these small firms is highly informal in the modern sense. There are no contracts signed and there is general agreement of payment, either daily or weekly (Al-Radi, 2007).

Truly native elements of Hadhrami construction are said to lie in Shibam. This walled city, with its current structure and plan, dates back to 1533 (Figure 19). However, this is the date of the latest rebuilding of the city.

² In *The Architecture of Mud*, the mason indicates his forearm length as a *dhra*’.

Figure 19: The Old Walled City of Shibam



Shibam stands dramatically on a rocky spur that surges out of the bed of the valley and is comprised of approximately 500 densely-knit, continuous tower houses often referred to as “skyscrapers”, that run up to 82 feet high; hence the city has been dubbed the “Manhattan of the Desert” (Breton, 1986). The homes are made out of traditional mud brick architecture that is the signature building style of the Hadhramaut Valley.

Shibam has long served as an en-route trading city for tribal caravans and international merchants. The design of the city is constrained by its position on high rocky ground and surrounding wall. This scarcity of horizontal space for expansion, political circumstances (its location between two sultanates that at times resulted in warfare), intense daytime heat coupled with sharp falls in nighttime temperatures, as well as seasonal flooding has led to its dense urban design. (Damluji, 1992: 76) The city was mainly home to the wealthy, while servicemen and artisans generally lived in surrounding quarters in makeshift housing. Shibam was an important commercial center and boasted extensive markets. UNESCO recognized the urban planning of this vertical city in 1982, when the Old Walled City of Shibam was declared a World Heritage Site.

For hundreds of years, Shibam played an important role as the political capital of the Wadi. The famed frankincense trade route traveled through here, and these “southern Arabian towns not only had great natural riches in the clefts of their own hills but were also the dumping ground for almost the whole of the Indian trade with the West before the silk route was opened through central Asia” (Stark, 1936: 113).

A strong mercantile community of shrewd businessmen comprising various associations developed here. Aside from lucrative trading, much of the wealth in Shibam also came from locals who emigrated abroad and invested it back here. Shibam continued its status as a commercial center until the middle of the 20th century, when Seyoun Airport was constructed and Seyoun began to take on more of a central market role in the Hadhramaut.

Approximately 3,500 residents live inside the 400 inhabitable mud brick towers in the Old Walled City of Shibam today. (Leiermann, 2007) Each of the tower houses is home to one family with a single entrance on the ground floor. The homes wind up narrow stairways with up to three rooms on each floor, and usually the ground floor is only used for storage. Many of these homes have stood here for centuries, and

the oldest dated house from its door-frame is Bayt Abdullah bin Fakik, dated 1609, although most houses in their most recent state date from 1880 to 1915. (Breton, 1986)

Today, Shibam District is comprised of the Old Walled City (Shibam) itself as well as three garden suburbs, Suhayl, Shabakh, and Shoheiga, lined one after the other across the main road. Here, the homes are also predominantly mud brick, although they have larger floor areas and are not quite as tall as the historic mini-skyscrapers. Together, the two-to-four storey buildings of the suburbs and the Old Walled City, making up Shibam District, are home to 48,293 residents.

Today, 80 to 90 percent of Shibam lies in sheer poverty (von Rabenau, 2006). Despite heritage designation for the Old Walled City, much of it was deteriorating in the late 1980s. Walls were in desperate need of replastering and the town was in need of revitalization and infrastructure. As a result, Shibam became the site of one of the world's most successful conservation management efforts to date.

In 1984, UNESCO began an international safeguarding campaign in order to revitalize the historic center of Shibam. A series of reports, most prominently one conducted by Ronald Lewcock in 1986, launched an appeal to make Shibam a base of an integrated regional socio-economic development program "aiming, among other things, to help revive various sectors of economic and cultural life and at the same time to restore the main buildings of the city of Shibam and Wadi Hadhramaut." (Lewcock, 1986: 9) However, due to economic decline and warfare, not much action was taken until 2000. A partnership with SFD and Germany's primary aid agency, GTZ, in 2000 marked the beginning of the Shibam Urban Development Project (SUDP). Through financial, technical, and social capacity development, the Yemeni and German governments have led the way for a multi-lateral approach to development inside the Old Walled City of Shibam.

GTZ has mainly facilitated infrastructure development as well as social and economic improvements throughout the historic city, making vast improvements in the provision of sewage, electricity, clean roads, and improvements in skills training, women's employment, and education. SFD has mainly facilitated housing revitalization. The partnership contains vital elements that shed light into the mud brick industry in Shibam. Through the SUDP program, nearly half of the mud buildings in the old city have seen improvements based on their original urban design guidelines conserving height and style, and employment has also increased.

The historical design guidelines that have shaped Shibam for centuries has been strategically applied to conserve the limited amount of space that constrains the tall city for environmental and safety reasons. However, this has also been the result of a centuries-old land use regulation that demarcated "the number of stories depended on the height of the land on which the houses stood", this uniformity in height regulations ensured that no rooftop overlooked another (Boxberger, 2002 79-80). This assured families privacy on their own rooftops. Each structure was built similar in plan, but all had different characteristics, based on the occupation of its dwellers. In this way, it is remarkable to see how the original zoning policies in this city have continued today.

In their renovation process, the trained architects, conservators, and engineers from GTZ and the General Organization for Antiquities and Museums (GOAM) as well as local master builders work together to maintain this unique zoning regulation building by building. The teams examine each deteriorating structure and provide project estimates, documentation, and designs for each building. This initial technical analysis is subsidized by GTZ. Through the SFD, owners of the Shibam buildings receive up to 35 percent of the building costs in micro-assistance based on unit construction cost, as established. Subsidies are higher for decorative and historically significant building elements, such as windows and doors.

In the case of complete building reconstruction, if a house is to be rebuilt from a ruin, subsidies rise with increasing height, providing more funding for the renovation of higher floors, as people today have very

little incentive to rebuild to the traditional height, and without this subsidy, Shibam eventually would be a city of just two to three floors. In this way, the demand-driven approach endorsed by SFD and GTZ offers an integrated method towards local economic development: labor-intensive mud brick renovations contribute to the development of local small and medium craft enterprises and at the same time conserve design guidelines.

GTZ is also responsible for a number of other partnerships and improvements in the Old Walled City of Shibam. The agency works with the General Organization for the Preservation of Historic Cities in Yemen (GOPHCY) in order to create legal provisions for maintaining urban design guidelines throughout Shibam and the Hadhramaut. This draft provision is similar and more detailed than the guidelines provided by the Hadhramaut government. In one way, this legal mandate could increase demand for mud brick construction. One of its mission goals is to conserve the traditional manufacturing trades that have defined the Hadhramaut for millennia. Through active promotion of mud brick and other local technologies, the draft law hopes to establish protection mechanisms for this industry. One element of the draft law establishes links for traditional craftsmen and their livelihood (Figure 21).

GTZ has also enacted an entrepreneurial non-governmental guild for building craftsmen. In May 2005, the guild was established in order to create increased job security and organization for Shibam's master craftsmen. As an incentive to join the guild, its members are given exclusivity over other craftsmen for construction projects in the Old Walled City of Shibam. (Hallaj, 2006) The collective preservation, rehabilitation, and craft-securing activities by GTZ in Shibam have proven to be "technically sound and financially viable": based on a survey in 2005, there had been an increase in construction employment by 127 percent and city-wide income in Shibam increased by 16 percent (von Rabenau, 2005: 13). This increase can be attributed to the work of GTZ, SFD, and their local partnerships and only applies to the World Heritage City itself and not the entire district.

CHALLENGES IN THE MUD BRICK INDUSTRY

Weak Institutions

With a lack of general conservation and planning mechanisms, Yemen has weak institutions in place with regards to the development of its cities in the Hadhramaut. While national plans are leaning towards developing SME's as a source for jobs and socioeconomic growth and while many mud brick agencies do resemble the SME, the fundamental issue in the Hadhramaut is that architecture and city form are informed by consumer demand. Government agencies commission GOAM and other preservation specialists to conserve their regional mud brick heritage and revitalize landmarks and regional monuments. (Al-Saggaf, 2007) However, on the everyday level, even the regional government offices are constructed in cement and boast central air conditioning and shiny marble floors. In fact, it was stated that government supports concrete buildings and that concrete is better than mud because of the latter's high maintenance issues. (Al-Guneid, 2007; Al-Bahbooh, 2007) This sentiment is echoed across the Wadi's newer neighborhoods, where concrete is fast-becoming a popular commodity in housing development. This brings to question how invested the central institutions are in promoting demand for their traditional building trades. Perhaps demand for mud brick construction will increase when its scarcity increases and its position as a regional, environmentally-friendly resource formally recognized.

Smallness and Informality in Mud brick Firms

On a fundamental level, mud brick construction is a learned craft that requires a high degree of practice and artisanship and this same element also contributes to the informal nature of this specialized trade. There are no books or formal schools that train aspiring mud brick craftsmen. Coupled with the obscure spatial relations that Yemen, and especially the Hadhramaut, has had with the remainder of the world, the

craft does not have a formal protocol or an officiated business model and has thus gone highly undocumented.

However, due to the smallness and informality of the mud brick buildings and lack of an overarching collectivizing agency, such as officiated regional or local guilds (aside from the GTZ program), it is hard for the industry to collectively permeate the official construction dialogue. They continue to decline and the modern construction sector continues to rise mainly due to institutional inefficiencies on part of the government and other coordinating quasi-governmental agencies. While mud brick architecture is highly respected and a source of pride for the Hadhramis, it is considered a difficult method of construction due to the high amount of regular maintenance that it needs. (Al-Guneid, 2007) Given the abundance of craftsmen, it is possible to conceive that governments cannot mandate conservation policies because at this juncture, it lacks the institutional capacity to coordinate conservation efforts and thus, resort to rendering the mud brick craft as less desirable. Formally incorporating the industry into the official rhetoric and creating institutional capacity at the government level to coordinate the enterprises, even through a regional registry or an agency such as GOAM or GOPHCY, its value could be reconstituted.

Need for technical assistance

With regard to training, the Shibam project led by GTZ has a formalized training mechanism in place in the form of technical assistance to bring a more formal nature to the trade. The mechanism goes into effect through a decision by the existing owner of a home in need of repair to apply for a SFD subsidy. Here there are homes in need of reconstruction, available technical assistance firms through GTZ, and an existing partnership between GOPHCY, GOAM, GTZ, and SFD, all independent entities to help architects and conservators train master craftsmen at the technical aspects of the revitalization and in turn, master masons are able to train apprentices as well as architect-conservators about their craft. To an extent, there is also technical assistance afforded by the TMPP because architect-conservators from around the world are able to collaborate and formalize techniques of documentation. Even GOAM employees remarked about having forged new partnerships between conservators and local mud brick masons for conservation projects (Al-Saggaf, 2007).

Need for documentation

Aside from city-specific documentation projects such as the SUDP and the TMPP as well as architectural surveys and books, the craft and its monuments have been preserved through records. In 1997, Italian architect Francesco Lavecchia conducted a year-long documentation and inventory survey and recognized 900 “cultural assets” in the Wadi Hadhramaut, including the three cities of Seyoun, Shibam, and Tarim, 392 villages, 123 archaeological sites, 83 castles, 106 mosques, and 153 other monuments. (Lavecchia, 1997) Yemen also has its own listings of cultural heritage and assets alike. Even the local Ministry of Public Works maintains its own roster of materials utilized for each new building that is constructed by offering a simple two-box option in the building permit application for “mud brick” or “concrete”. However, while such information would be extremely useful, there is a general need for documenting mud brick enterprises themselves.

From approximately 30 master masons in Seyoun to 200 documented in Shibam’s mud masons’ guild to approximately 225 in Tarim, the figures for actual mud brick craftsmen and their inter-firm organization are currently unavailable or weak. (Al-Saggaf, 2007; Fagi, 2007; Hallaj, 2006; Gashan, 2007) In 2004, plans and funding were earmarked to establish an Association for Mud Masons in one of the Tarimi *qasrs*, although that has yet to happen. (Jerome, 2004) This notion is reverberated in the fact that mud brick construction, like other traditional building technologies that dominate Yemen does not make up a formal industry within the macroeconomic framework.

While most single projects have a small team that accompanies the master craftsman, as mentioned before, some large-scale projects involve a team of a dozen or so craftsmen and builders. The architectural restoration of the Amiriya Madrasa in the city of Rada is one such example. The project, led by Dr. Selma Al-Radi, lasted from 1983 to 2005. Notably, the exterior restoration of the monument has brought back an ancient technique of lime plastering, known as *qudad*. The project established a core group of restorers and trained Yemeni craftsmen and conservators in specialized preservation tasks such as painted surfaces conservation. The project employed about a dozen local craftsmen, and the master craftsman, the *usta*, remained with the project from its conception to completion. (Al-Radi, 2007)

It is possible that as these enterprises gain income through private demand, cultural heritage projects, SME funding, as well as a portion of the generic construction sector that also encompasses infrastructure and industrial building, mud brick firms are not formally recognized as a viable source of income production. Perhaps it is not a strong source of income, has been traditionally practiced by less prestigious strata of the regional society, and is considered downright old-fashioned, but mud brick has informed the spatial development of Wadi Hadhramaut for generations, is a highly established craft, and actively dominates current projects are indicators that at this time, there still exist incentives and opportunities for this industry.

OPPORTUNITIES IN THE MUD BRICK INDUSTRY

Despite the changing nature of the built environment in the Hadhramaut, the building trade holds a particular resilience to time due to its extraordinary ability to utilize *métis*, specialized local knowledge, and the historically-embedded apprenticeship process as an ongoing element. The high levels of informality and lack of regulation also serve as an advantage for the firms, affording them automatic flexible production capabilities. Thus, the small and informal nature of the firms allows them to collectivize for large-scale projects (like the renovation of the Seyoun Palace and Al Hawta Palace Hotel) and also individually maintain single-home development projects.

Focused around the mud brick firm as the central enterprise, the conservation-development framework developed in the foreground of this investigation reinterprets the ground rules for conservation and development imperatives within the same set of inputs and outputs. The fate of the enterprise and its production chain lies in the provision of strong institutional foundations at the national and regional levels through effective policy for the process to be more capable of manifesting locally, technical and financial capacity, and basic imperatives, or demand for employment.

Mud brick building industry in Hadhramaut and Yemen has been historically bound to social structures which have allowed the development of these traditional building techniques and apprenticeship processes as well as created institutions that have supported the craft in the Wadi Hadhramaut for millennia. The enterprises here serve as an example of how regions have been able to capitalize on local raw materials, skills, and labor practices to define the built environment. Today, the mud brick firms in the Wadi Hadhramaut still operate by applying their highly specialized skills. In this way, the process and skills involved have been resilient over time.

The recent government and non-governmental projects presented in the case studies intertwined with the sociopolitical history of Yemen seek to provide technical and financial capacity to historically significant mud brick enterprises. The national government is creating policies to reduce poverty and increase jobs and improve economic growth by way of a decentralized approach bringing the SME to the foreground. Highly specialized firms, like mud brick enterprises, can play a central role as a regional growth sector in the Hadhramaut: they are flexible as they can also produce modernized construction using traditional techniques and they are labor-intensive with the capacity to generate local jobs. Mud brick enterprises

also utilize local materials, thus sustaining regional raw material vendors, maintaining strong production linkages with the region.

LOOKING AHEAD

As post-industrialized economies move towards policies of flexible specialization and economies of scope versus mass production, as well as new international norms promoting environmental sustainability, the mud brick sector offers many modern organizational forms that can be developed by increasing their technical capacity, subsidies for firms to expand, and, in turn, meet modern development aims in the Wadi. Conserving the trade can not only protect cultural heritage in the Wadi Hadhramaut generating tourism income, but also continue to be a general form of regionally sustainable, labor-intensive, job-creating construction sector.

Through land use policies calling for the conservation of heritage and effective adaptive reuse management, existing places can be effectively protected. New construction in mud brick can also be conserved by partnerships between regional institutions, mud brick enterprises, and architects and engineers to bring technical and financial capacity to mud brick firms. In addition, demand for the mud brick enterprises can be supported by additional subsidies to households and residents to meet conservation aims and utilize the traditional construction method for new homes, as is the case in Shibam.

The joint complexity of conservation and development challenges presented here can actually serve as a boon for the effective planning and capacity building in Yemen and especially the unique city forms of the Wadi Hadhramaut. Mud brick architecture is a source for jobs and economic development for the Hadhramaut region, and this growth has thus far remained unchecked and purveyed as a form of “cultural heritage”. Their smallness is an advantage as this trait allows them to be nimble and form alliances with ease. Growing nations like Yemen has every opportunity to look towards the myriad of innovative qualities that are presented in potentially “obsolete” practices like mud brick construction. Conserving mud brick technology is not the novel idea, however, the way in which their resilient makeup has the potential to take on new and notable forms is worth a glance.

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